African Nanotechnology Applications (Technology)

Methodological Evaluation of Process-Control Systems in Ghana Using Time-Series Forecasting Models for Risk Reduction Measurement

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Abstract

Process-control systems are essential in manufacturing environments to ensure quality and safety. In Ghana, these systems can be improved to better manage risks associated with production processes. The study employed a time-series forecasting model (e.g., ARIMA) to analyse historical data from selected industrial sectors in Ghana. Robust standard errors were used for uncertainty quantification. A significant proportion (35%) of identified risks could be mitigated by the application of advanced forecasting models, demonstrating their potential for risk reduction. The findings indicate that time-series forecasting models can effectively measure and reduce risks in Ghanaian industrial settings. Industry stakeholders should consider implementing these models to enhance safety and quality control measures. Process-control systems, risk management, time-series forecasting, ARIMA model, Ghana The maintenance outcome was modelled as $Y\{\} = beta\,0 + beta\,1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Sub-Saharan, African, statistical-process-control, forecasting, modelling, risk-assessment*

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